1-1940

# Rural Water Supplies in South Dakota : Hughes County

Walter V. Searigh
*Cooperative Extension Service, South Dakota State College*

Elmer E. Meleen
*Cooperative Extension Service, South Dakota State College*

# Rural Water Supplies in South Dakota

# HUGHES County

January, 1940
Special Extension Circular
Number 47



Extension Service
South Dakota State College
Brookings, S. D.

# RURAL WATER SUPPLIES

IN

SOUTH DAKOTA

# HUGHES COUNTY

BY

WALTER V. SEARIGHT

AND

ELMER E. MELEEN



PREPARED BY THE WORK PROJECTS ADMINISTRATION AS A REPORT ON THE WELL SURVEY CONDUCTED AS WORK PROJECTS ADMINISTRATION OFFICIAL PROJECT 665-74-3-126; SPONSORED BY THE EXTENSION SERVICE AND THE EXPERIMENT STATION SOUTH DAKOTA STATE COLLEGE, IN COOPERATION WITH THE STATE GEOLOGICAL SURVEY.

JANUARY 1940.

## FOREWORD

This study was first proposed as a project of the Mineral Resources Committee of the State Planning Board under the direction of the State Geological survey and undertaken as a Work Projects Administration project sponsored by the State Planning Board, and was continued under the Planning Board until that body was abolished July 1, 1939 by the State Legislature. At that time sponsorship was transferred to the South Dakota Agricultural Experiment Station and the State College Extension Service, South Dakota State College. Field work was begun October 1, 1938 and was practically completed by February 15, 1939. Workers were assigned in the several counties under the supervision and direction of the County Agricultural Agents and Field Supervisors who were employed by the Work Projects Administration. Questionnaires were mailed out from the offices of the County Agents and were checked and tabulated in these offices. The material was then forwarded to the central office for final tabulation and analysis under the direction of Elmer E. Meleen and Walter V. Searight.

Particular credit should be given to the individual County Agricultural Agents in the various counties of the state who arranged the contacts with the individuals from whom these data were collected, furnished a large portion of the necessary supplies for field work, and directed the workers engaged in collecting field data. Without this assistance in gathering basic data, this study could not have been conducted. The value of the report is therefore in direct proportion to the accuracy and adequacy of these basic data.

# INTRODUCTION

## PURPOSE

This report on rural water supplies of South Dakota has been prepared to present data recently made available on the types and the sources of water supply, exclusive of stream, lake and dam waters. The information presented is of importance to evaluate present supplies. It should also prove useful as a basis for further development of supplies where they are needed or become necessary. Further, it is hoped that the facts presented may prove of value in any program of water conservation.

## SOURCES OF INFORMATION

Questionnaires were sent to all, or essentially all of the farmers of the state, asking for complete data on farm wells and supplementary supplies, with the exception of the supplies above noted. A most gratifying number returned questionnaires, actually 60.1% average for the entire state. The coverage is probably more than 60.1% since it is likely that many unanswered inquiries were those to farmers who were without wells, the type of supply emphasized in the questionnaires. The data thus obtained were supplemented with information contained in the files of the State Geological Survey, the office of the State Engineer, and reports of the United States Geological Survey. This supplementary information, together with that contained in questionnaires was used in making the well location maps included in this report.

## PROCEDURE

All data from the questionnaires were tabulated and analyzed statistically by counties, which were made the areal units of study. Within the county,

Acknowledgments - The authors wish especially to acknowledge and commend the conscientious assistance of Mr. E. L. Woodburn, Supervisor, for careful and painstaking supervision of statistical work. The authors also desire to express appreciation for the constant interest and support of this project by Mr. Bob Butts, Director of Research and Records Projects, South Dakota Work Projects Administration.

supplies were allocated as to kind on county maps. Since shallow waters are the most important source of rural supply in South Dakota, wells 200 feet deep and less were plotted on county maps from which maps indicating depths of wells by 50 foot intervals were made. Springs, shown on the well location map, and cisterns were also tabulated as important supplementary supplies, although the latter do not appear on maps or in the tables in this report.

PRESENTATION OF DATA

For convenience and utility, this report has been divided into sections each covering one county, and each county section bound separately. Each county report contains the following material wherever possible.

1. Well Location Map: This map shows the location of all wells and springs within the county, so far as information is now available. These have been plotted in such a manner that artesian and shallow wells can be differentiated readily by the reader. Artesian wells, where they occur, are divided into flowing and pumped. Artesian wells showing decreased flow and those reported as controlled are also indicated by symbols. Shallow wells are differentiated as adequate and inadequate, and dry holes as of 1938 are located. Wells from other sources of information other than questionnaires collected by this survey are shown in blue.

2. Shallow Well Map: This map shows, as accurately as possible, in 50 foot intervals, the depths at which shallow supplies are commonly obtained. Where shallow wells are abundant, as indicated by the well location map, the map is as accurate as the information on which it is based, but where such wells are sparsely distributed errors are likely to occur. In many places reports of shallow wells are absent in which case the area has been left blank.

3. Table of Pumped Wells, from 0 to 200 feet (inclusive) in depth: This table shows minimum, maximum, and average depths of wells within the county, as reported in the questionnaires. Tabulations are by townships. The general character of the water, hard, medium, and soft, as reported by farm-

ers, and the number of wells suitable or unsuitable for drinking are shown in this table. Further, the adequacy of supply, as indicated on the questionnaires, and use for irrigation are shown here.

4. Table of Wells greater in depth than 200 feet: Minimum, maximum, and average depths are indicated. Character, reported as hard, medium or soft is tabulated. Adequacy and use for irrigation are shown as in the preceding table.

5. Table of flowing wells: Minimum, maximum, and average depths are shown together with general character and use for irrigation. The volume of flow as reported, and the number of flowing wells reported as equipped with control valves is also included in this table.

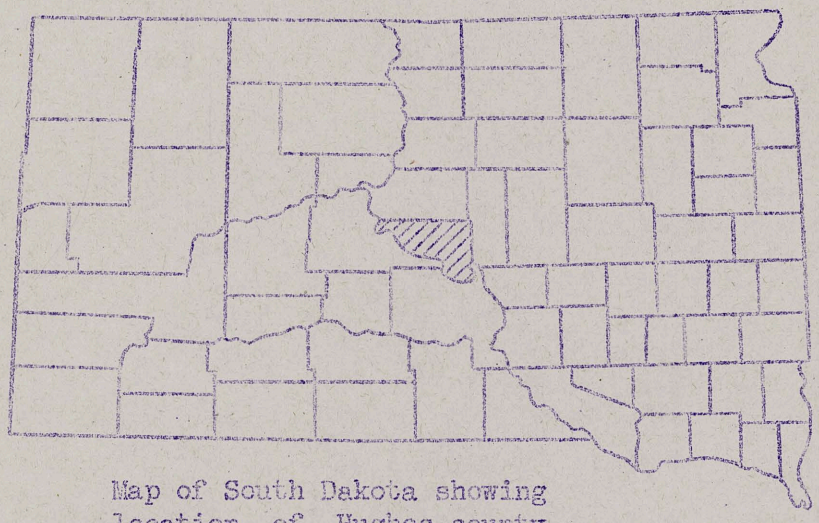
SUMMARY OF STATE SUPPLIES

In the entire state, a total of 48,479 wells were reported in response to questionnaires, returned by 60.1% of the recipients. If those who did not respond have a number of wells in proportion to those who reported, there are approximately 80,000 wells in South Dakota. There are possibly many less than this number since several counties with large numbers of wells returned over 75% of the questionnaires and since many farmers without wells did not reply because they were not requested to do so in the formal questionnaires. Of the wells reported, 16.2% are artesian, including both pumped and flowing wells. Shallow wells are 83.8% of the wells reported. Wells from shallow sources are thus obviously by far the most important means for obtaining water in rural South Dakota.

Important supplementary supplies are cisterns and springs. Roughly, there is more than one cistern to each 40 wells. Many springs are reported, however, in counties with very few wells, so that in some localities they are of considerable importance.

## Hughes County

Hughes county lies in the central part of South Dakota. It is bounded on the north by Sully county, on the east by Hyde county, on the south by Lyman county, and on the west by Stanley county.



Map of South Dakota showing location of Hughes county

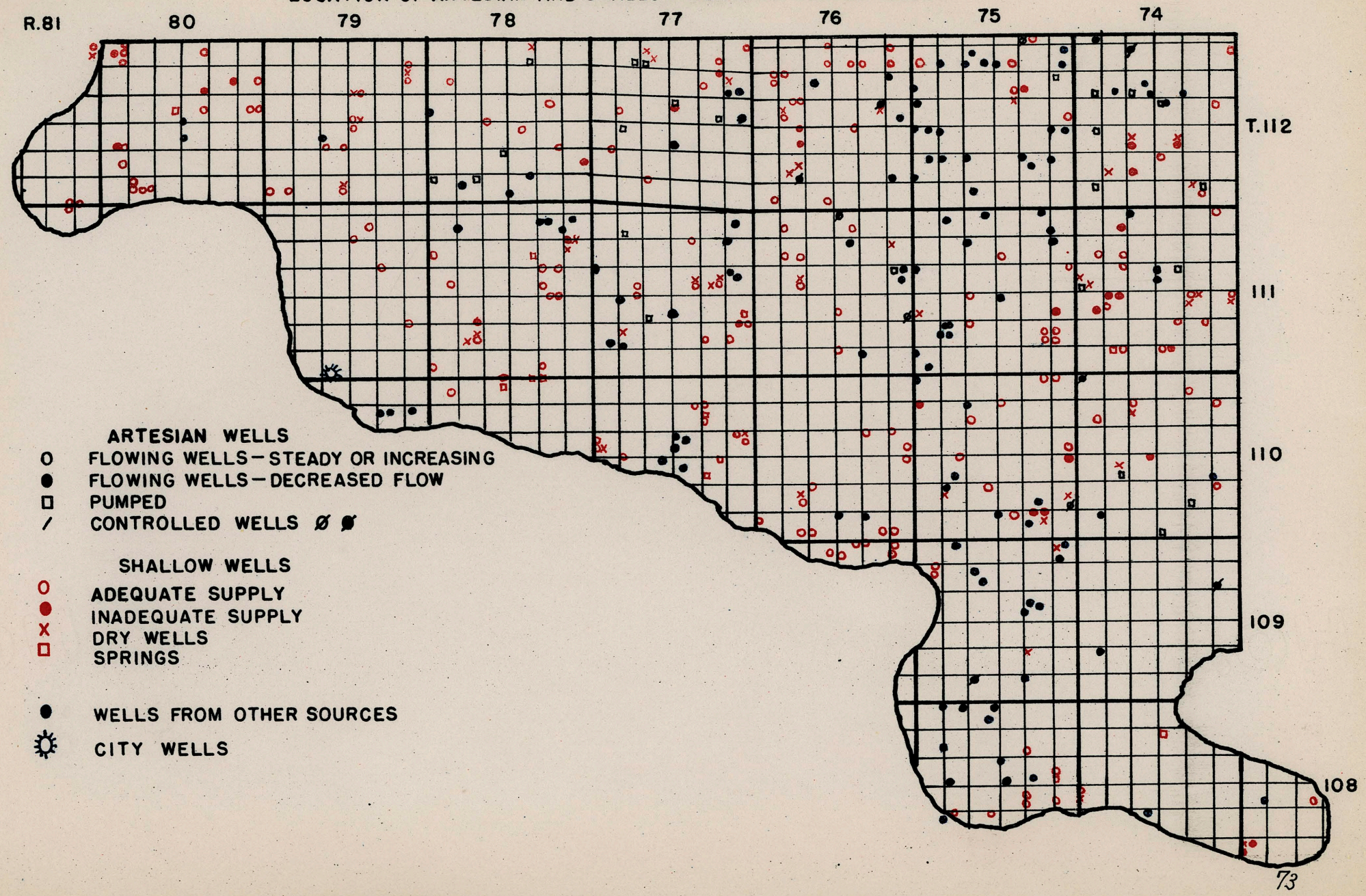
Agriculture is the main industry of Hughes county, with 331,661 acres, (68.3 per cent) of the total 485,760 acres in farms. There are 547 farms in the county with an approximate 606 acres in each farm unit. Wheat, hay, corn, barley, rye, and oats are the important field crops, being produced in the order named. Livestock is also important; cattle, sheep and lambs, horses and mules, and hogs are valued in the order named.*

Farm units devoted chiefly to livestock and dairy cattle as in Hughes county required generally distributed sources of water supplies. The supplies required are not great, but adequate and constant supplies of suitable water at low cost are necessary to operate farms of these sizes and organization profitably.

On the well location map of Hughes county, all flowing and all deep pumped wells obtaining water from artesian sources, mostly the Dakota-Lakota sandstones, are shown in black as artesian wells. All other wells are shown in red and are called shallow wells regardless of depth. On all other maps and in

*South Dakota Agricultural Statistics, Annual Report, 1937

# LOCATION OF ARTESIAN AND SHALLOW WELLS IN HUGHES COUNTY



tables and text of this report, the term shallow wells applies to all wells of 200 feet in depth or less,and those greater than 200 feet in depth are treated as deep wells,including all artesian wells except those flowing wells 200 feet or less in depth.

Hughes county returned 242 questionnaires representing a 58.6 per cent coverage with information on 243 wells, or an average of 9.7 wells per township. This number is probably adequate to support the conclusions drawn in this report.

DEPTH AND DISTRIBUTION

Most of the rural water supplies of Hughes county come from shallow pumped wells, but deep pumped and deep flowing wells are also reported. All townships reported less than one well per square mile (see well location map).

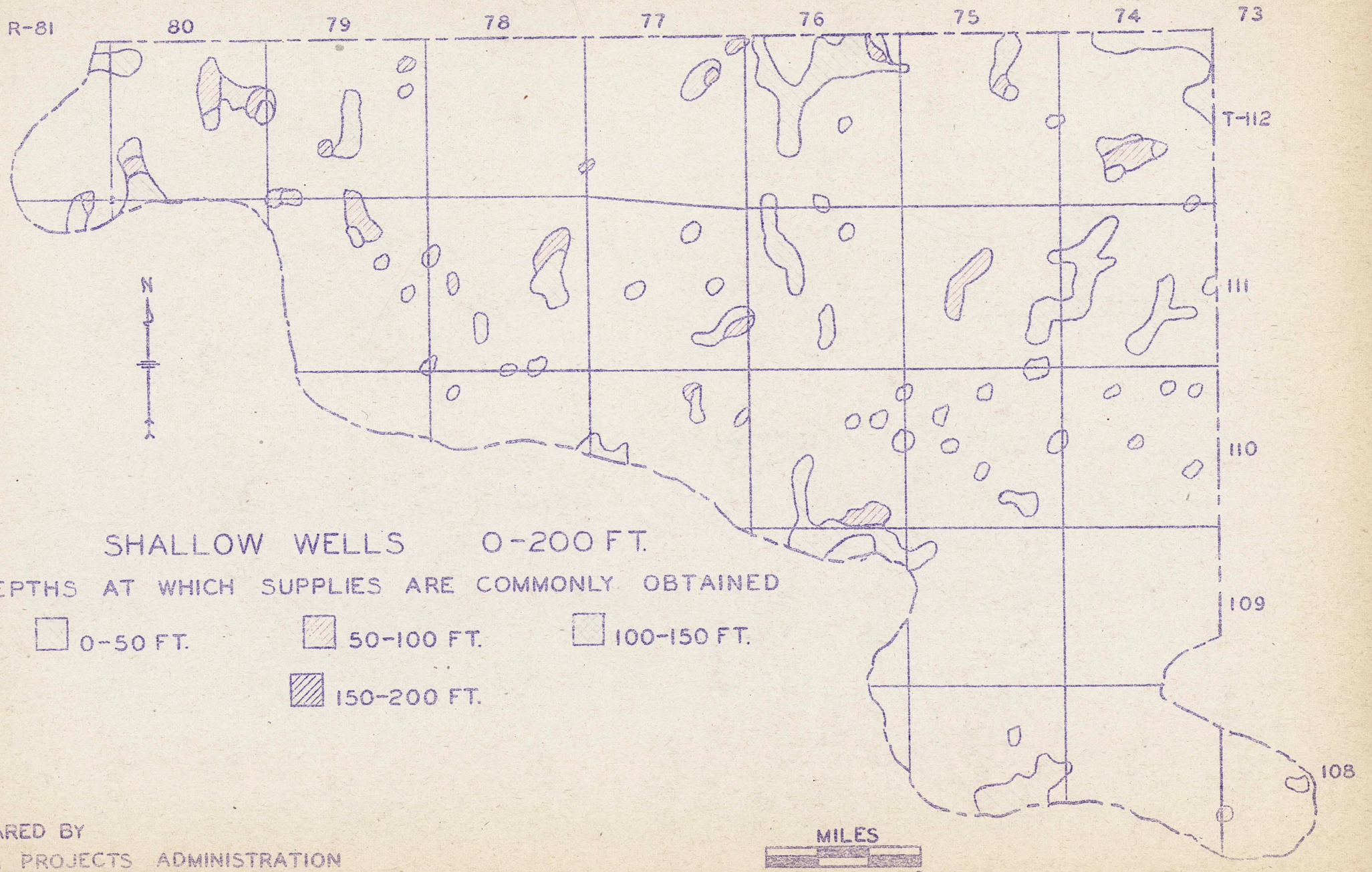
Shallow wells: Approximately three fourths (75.3 per cent) of all wells reported in the county were shallow pumped wells (see table 1). Most of the shallow pumped wells occur in the northern half of the county. Of the 183 reported, 69.4 per cent of the shallow pumped wells were between 0 to 50 feet; 16.8 per cent between 50 to 100 feet: and 9.8 per cent from 100 to 150 feet. Thus, approximately 86.2 per cent of the shallow supply was obtained between the depths 0 to 100 feet. Only four per cent of the wells were between the depths of 150 to 200 feet.

Twelve townships reported all wells to be shallow wells. These townships have been tabulated as follows:

| Twp. | Rge. | Twp. | Rge. |
|---|---|---|---|
| 108N | 73W | 110N | 78W |
| 108 | 74 | 111 | 78 |
| 109 | 76 | 111 | 79 |
| 110 | 76 | 111 | 81 |
| 110 | 77 | 112 | 78 |
| 112 | 80 | 112 | 79 |

The following four townships reported 80 per cent to 90 per cent shallow wells:

# HUGHES COUNTY




## SHALLOW WELLS 0-200 FT.

DEPTHS AT WHICH SUPPLIES ARE COMMONLY OBTAINED

- 0-50 FT.
- 50-100 FT.
- 100-150 FT.
- 150-200 FT.

MILES

0 2 4 6

PREPARED BY
WORK PROJECTS ADMINISTRATION
O.P. 665-74-3-126 W. P. 3636

| Twp. | Rge. | Per cent Shallow | Twp. | Rge. | Per cent Shallow |
|---|---|---|---|---|---|
| 110N | 75W | 85.7 | 111N | 75W | 90. |
| 111 | 74 | 88.9 | 112 | 76 | 84.3 |

Five townships reported one half to two thirds of the wells to be shallow wells. These are tabulated below:

| Twp. | Rge. | Per cent Shallow | Twp. | Rge. | Per cent Shallow |
|---|---|---|---|---|---|
| 108N | 75W | 63.7 | 110N | 74W | 54.5 |
| 109 | 75 | 50. | 111 | 77 | 61.5 |
| 112 | 75 | 66.7 | | | |

No shallow wells were reported in Twp. 109N., Rge. 74W.

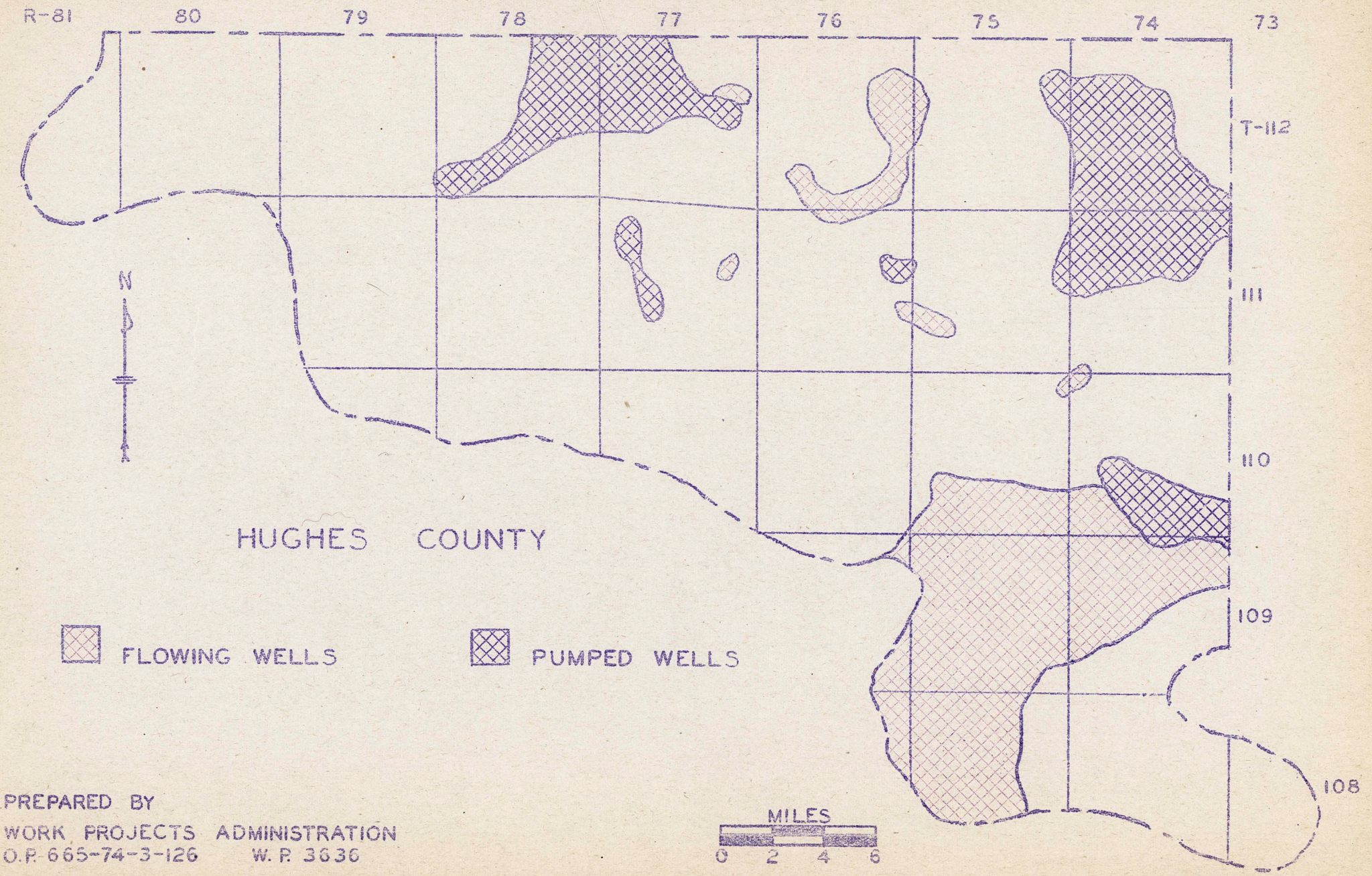
Deep wells: Deep wells (pumped and flowing) were approximately one fourth (24.6 per cent) of all wells reported in the county. Of these, 29 were deep pumped and 31 deep flowing (see table 2).Three tiers of townships, Twp. 108N., Twp. 109N., and Twp. 110N., reported no deep pumped wells. One township, Twp. 112N., Rge. 78W., reported 90 per cent deep pumped wells;another, Twp. 112N., Rge. 77W., reported 64.3 per cent deep wells.

The deep pumped wells reported from six townships in the county range in depth from 230 to 1640 feet. A tabulation of these townships and number of deep pumped wells follows:

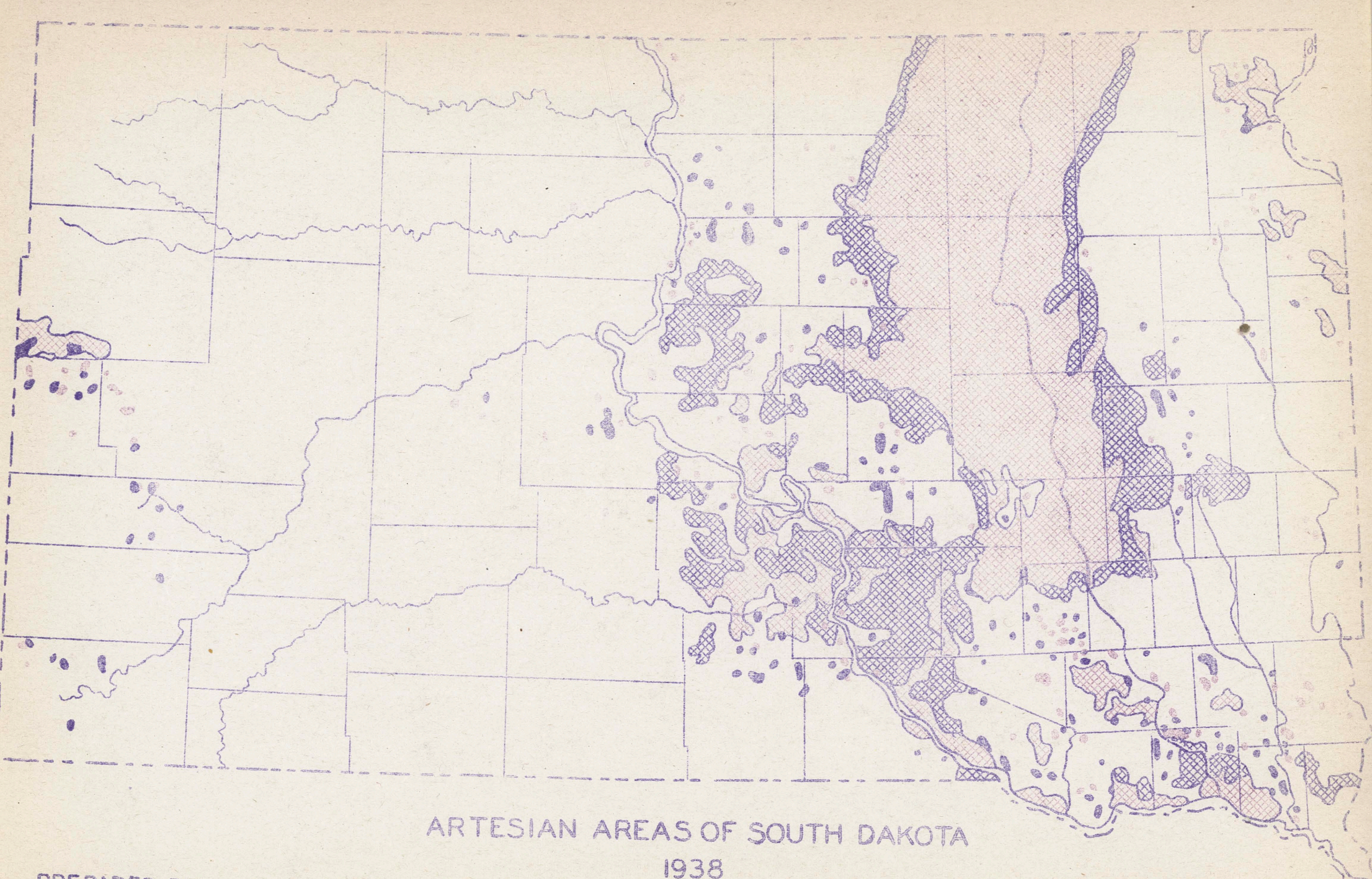
| Twp. | Rge. | Number of Wells (Deep Pumped) | Twp. | Rge. | Number of Wells (Deep Pumped) |
|---|---|---|---|---|---|
| 108N | | 0 | 112N | 74W | 6 |
| 109 | | 0 | 112 | 75 | 1 |
| 110 | | 0 | 112 | 77 | 8 |
| 111 | 74W | 2 | 112 | 78 | 9 |
| 111 | 77 | 3 | | | |

Thirty one deep flowing wells were reported in twelve townships in the county. These wells did not, however, occur in the same areas as the deep pumped. Fifteen were reported in Twp. 108N., Twp. 109N., and Twp. 110N., areas in which no deep pumped occurred. The areas of flowing wells, together with those of deep pumped artesian wells, appear on the artesian map of Hughes county, and the relation of these areas to those of the state may be determined from the artesian map of South Dakota.

# ARTESIAN AREAS 1938




PREPARED BY
WORK PROJECTS ADMINISTRATION
O.P. 665-74-3-126 W.P. 3636


ARTESIAN AREAS OF SOUTH DAKOTA
1938
PREPARED BY
WORK PROJECTS ADMINISTRATION
O.P 665-74-3-126
W.P 3636
FLOWING WELLS
PUMPED ARTESIAN WELLS

## CHARACTER OF WELL WATERS

The character of the water in the county was determined from the responses by the users to the questionnaires. Each farmer was asked whether he considered water from his well to be hard, moderately hard, or soft. The most satisfactory method, chemical analysis, is not commonly available to the farmers, but usage is probably a fairly good criterion and must be accepted until laboratory analyses are available.

Most of the water from shallow wells of Hughes county is hard.

Of the 183 shallow pumped wells, 157 were reported on as to character of water. A total of 82 (52 per cent) were hard; 55 (35 per cent) moderately hard; and 20 (13 per cent) produced soft water. Thus, 87 per cent of shallow wells reported by farmers produced hard or moderately hard water. Ten of these wells reported to supply water unsuitable for drinking.

Water from three of the deep pumped wells was reported hard, from eight as moderately hard, and from eighteen as soft, of the 29 deep pumped wells reported. Wells penetrating deeper sources include more wells which produce soft water. The larger percentage of hard water in wells of these depths differs from that in shallow wells. Water from two of the deep pumped wells was reported unsuitable for drinking; one of these produced unsuitable hard water from a depth of 239 feet and the other produced unsuitable soft water from a depth of 1475 feet.

Deep flowing wells produce water similar in character to that from deep pumped wells. Five of the deep flowing wells were reported moderately hard and 23 soft. One of these wells was reported unsuitable for drinking. This well was 1354 feet in depth and the water was reported soft.

## ADEQUACY OF WELL WATER

Users reported supplies adequate, as a rule, for current needs in Hughes

county. Needs vary, however,and changes in land utilization, and farm management as well, amounts of water in the sources may vary both demand and supply.

Twenty seven shallow pumped wells were reported inadequate, with 154 adequate for farm use.

All of the deep pumped wells were reported adequate (29). Adequacy of the deep flowing wells was not reported. However, a well in Twp. 110N., Rge. 75W., reported a flow of 400 gallons per minute at a depth of 1250 feet. Ten deep flowing wells were reported to be equipped with control valves.

IRRIGATION

Seventeen shallow pumped wells were used to irrigate approximately 5 1/2 acres of land. Five deep pumped wells were reported to be used for irrigation, four wells irrigating approximately 1 1/4 acres. Two deep flowing wells were used for irrigation, one well irrigating one acre of land. One spring was reported used for irrigation.

SUPPLEMENTARY SUPPLIES

Springs and cisterns are commonly important sources of supplementary supplies in eastern South Dakota. Twelve springs were reported from Hughes county in eight townships. Two townships, Twp. 110N., Rge. 77W., and Twp. 110N., Rge. 78W., reported three springs each and six townships reported one each. One spring was reported hard in character, two moderately hard, and five soft. Eleven springs were adequate and one inadequate for present needs. Approximately 1825 head of livestock were watered by these springs. The townships and number of springs reported in each are tabulated as follows:

| Twp. | Rge. | Number of Springs | Twp. | Rge. | Number of Springs |
|---|---|---|---|---|---|
| 108N | 74W | 1 | 111N | 74W | 1 |
| 108 | 75 | 1 | 111 | 77 | 1 |
| 110 | 77 | 3 | 111 | 78 | 1 |
| 110 | 78 | 3 | 112 | 80 | 1 |

Forty one cisterns were reported in the entire county, although they were not evenly distributed. Township 108N., and Twp. 109N., reported no cisterns, although 28 wells were reported, 20 of which were shallow pumped. Six cisterns were reported in Twp. 110N., with 46 wells, which is approximately one cistern to eight wells. Township 111N., reported 11 cisterns, with 70 wells, or about six wells to each cistern. Township 112N., reported 23 cisterns to 99 wells, or approximately four wells per cistern. Of the cisterns reported, 27 were supplied by rain and 11 hauled from other sources. In Hughes county as elsewhere in the state, cisterns serve as a substitute for hard well water supplies for laundry purposes and to some extent for drinking and cooking where wells supply unsuitable or inadequate water.

HUGHES COUNTY

Table 1.

DATA ON PUMPED WELLS FROM 0 TO 200 FEET (INCL.) IN DEPTH

| LOCATION | | Number of Wells | DEPTH OF WELLS | | | CHARACTER OF WATER | | | | | ADEQUACY OF SUPPLY | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Twp. | Rge. | | Min. | Max. | Ave. | Hard | Med. | Soft | Corrode Casing | Unsuitable for Drinking | Adequate | Inade-quate | Number used for Irrigation | Approximate Acres Irrigated |
| 108 | 73 | 3 | 40 | 59 | 49 | - | 1 | 1 | - | - | 1 | 2 | 1 | 1/8 |
| 108 | 74 | 1 | - | - | 12 | - | 1 | - | - | - | 1 | - | - | - |
| 108 | 75 | 7 | 12 | 35 | 24 | 1 | 3 | 3 | - | - | 7 | - | - | - |
| 109 | 75 | 2 | - | - | 25 | - | - | - | - | - | 2 | - | - | - |
| 109 | 76 | 7 | 20 | 80 | 31 | 3 | 2 | 1 | - | - | 7 | - | - | - |
| 110 | 74 | 6 | 30 | 113 | 56 | 3 | 2 | - | - | - | 5 | 1 | - | - |
| 110 | 75 | 12 | 12 | 40 | 22 | 8 | 2 | 1 | 2 | 1 | 8 | 4 | 1 | 1/8 |
| 110 | 76 | 11 | 10 | 52 | 29 | 5 | 4 | - | 1 | 1 | 11 | - | 1 | 3 |
| 110 | 77 | 8 | 10 | 40 | 26 | 6 | - | 1 | 1 | 1 | 8 | - | - | - |
| 110 | 78 | 2 | 12 | 30 | 21 | 2 | - | - | 1 | 1 | 2 | - | - | - |
| 111 | 74 | 16 | 12 | 100 | 41 | 6 | 5 | 1 | - | 1 | 11 | 5 | 2 | 1/8 |
| 111 | 75 | 9 | 9 | 81 | 44 | 6 | - | 1 | - | 1 | 8 | 1 | - | - |
| 111 | 76 | 7 | 14 | 116 | 41 | 4 | 2 | 1 | - | - | 7 | - | - | - |
| 111 | 77 | 8 | 14 | 84 | 48 | 2 | 1 | 2 | - | 1 | 7 | 1 | 1 | 1/2 |
| 111 | 78 | 12 | 12 | 105 | 43 | 6 | 3 | 2 | 1 | - | 10 | 2 | 2 | 5/8 |
| 111 | 79 | 4 | 44 | 150 | 102 | 2 | 1 | 1 | 1 | 1 | 4 | - | - | - |
| 111 | 81 | 3 | 20 | 63 | 37 | 2 | 1 | - | - | - | 3 | - | 1 | 1/8 |
| 112 | 74 | 7 | 20 | 110 | 51 | 3 | 3 | 1 | 1 | 1 | 4 | 3 | 2 | 1/4 |
| 112 | 75 | 6 | 20 | 118 | 66 | 4 | - | 1 | 1 | - | 5 | 1 | 1 | 1/8 |
| 112 | 76 | 17 | 8 | 115 | 35 | 7 | 9 | 1 | - | - | 15 | 2 | 1 | - |
| 112 | 77 | 5 | 76 | 121 | 102 | 2 | 1 | 1 | 2 | - | 3 | 2 | - | - |
| 112 | 78 | 1 | - | - | 164 | - | 1 | - | - | - | - | 1 | - | - |
| 112 | 79 | 10 | 35 | 195 | 120 | 4 | 5 | 1 | - | - | 10 | - | - | - |
| 112 | 80 | 19 | 11 | 150 | 51 | 6 | 8 | - | 1 | 1 | 15 | 4 | 4 | 1/2 |
| Total | | 183 | | | | 82 | 55 | 20 | 12 | 10 | 154 | 29 | 17 | 5 1/2 |

NOTE: No wells reported for T.109 R.74. in this group.

HUGHES COUNTY

Table 2.

DATA ON PUMPED WELLS OVER 200 FEET IN DEPTH

| LOCATION | | Number of Wells | DEPTH OF WELLS | | | CHARACTER OF WATER | | | | | ADEQUACY OF SUPPLY | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Twp. | Rge. | | Min. | Max. | Ave. | Hard | Med. | Soft | Corroded Casing | Unsuitable for Drinking | Adequate | Inade-quate | Number used for Irrigation | Approximate Acres Irrigated |
| 111 | 74 | 2 | 1528 | 1600 | 1564 | - | - | 2 | 1 | - | 2 | - | 1 | - |
| 111 | 77 | 3 | 250 | 1520 | 1057 | - | 2 | 1 | 1 | - | 3 | - | - | - |
| 112 | 74 | 6 | 1050 | 1640 | 1478 | - | - | 6 | 2 | - | 6 | - | - | - |
| 112 | 75 | 1 | - | - | 1500 | - | - | 1 | - | - | 1 | - | - | - |
| 112 | 77 | 8 | 230 | 1590 | 1040 | 1 | 2 | 5 | 3 | 1 | 8 | - | 1 | 1/8 |
| 112 | 78 | 9 | 239 | 1582 | 740 | 2 | 4 | 3 | 2 | 1 | 9 | - | 3 | 1 1/8 |
| Total | | 29 | | | | 3 | 8 | 18 | 9 | 2 | 29 | | 5 | 1 1/4 |

NOTE: No wells reported for the following townships and ranges in this group: T.108 R.73, 74, 75; T.109 R.74, 75, 76; T.110 R.74, 75, 76, 77, 78; T.111 R.75, 76, 78, 79; T.112 R.76, 79, 80; T.111 R.81.

HUGHES COUNTY

Table 3.

DATA ON FLOWING WELLS

| LOCATION | | Number of Wells | DEPTH OF WELLS | | | CHARACTER OF WATER | | | | | ADEQUACY OF SUPPLY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Twp. | Rge. | | Min. | Max. | Ave. | Hard | Med. | Soft | Corroded Casing | Unsuitable for Drinking | Adequate | Inade-quate | Number used for Irrigation | Approx. Acres Irrigated | Ave. Gallon Per Min. | Number Con-trolled |
| 108 | 75 | 4 | 1100 | 1280 | 1154 | - | 2 | 1 | 2 | - | 4 | - | - | - | 30 | - |
| 109 | 74 | 2 | 1125 | 2300 | 1712 | - | 1 | 1 | 1 | - | 2 | - | - | - | 15 | 1 |
| 109 | 75 | 2 | 1260 | 1360 | 1310 | - | - | 1 | - | - | 2 | - | - | - | 11 | 1 |
| 110 | 74 | 5 | 1200 | 1720 | 1474 | - | 1 | 4 | 3 | - | 4 | 1 | 1 | - | 3 | 1 |
| 110 | 75 | 2 | 1250 | 1400 | 1325 | - | 1 | 1 | 2 | - | 2 | - | 1 | 1 | 400 | 1 |
| 111 | 75 | 1 | - | - | 1500 | - | - | 1 | 1 | - | - | 1 | - | - | - | - |
| 111 | 76 | 3 | 1400 | 1650 | 1517 | - | - | 3 | 3 | - | 3 | - | - | - | 40 | 2 |
| 111 | 77 | 2 | 1408 | 1560 | 1484 | - | - | 2 | - | - | 1 | 1 | - | - | 2 | - |
| 112 | 74 | 3 | 1400 | 1500 | 1450 | - | - | 3 | 1 | - | 2 | 1 | - | - | 3 | 1 |
| 112 | 75 | 2 | 1300 | 1500 | 1400 | - | - | 1 | - | - | 2 | - | - | - | 25 | 1 |
| 112 | 76 | 4 | 1200 | 1354 | 1301 | - | - | 4 | 1 | 1 | 4 | - | - | - | 13.66 | 2 |
| 112 | 77 | 1 | - | - | 1600 | - | - | 1 | - | - | 1 | - | - | - | - | - |
| Total | | 31 | | | | - | 5 | 23 | 14 | 1 | 27 | 4 | 2 | 1 | | 10 |

NOTE: No wells reported for the following townships and ranges in this group: T.108 R.73, 74; T.109 R.76; T.110 R.76, 77, 78; T.111 R.74, 78, 79, 81; T.112 R.78, 79, 80.

## Hughes County Well Notes

The following are pertinent remarks quoted from questionnaires returned by farmers and are included opinions of the water situation as expressed by the individual farmers and must be so applied.

Twp. 109N., Rge. 76W.
Sec. not given

80 feet:
"Shale & shale rock interfere with drilling, although the present well is not exact on vein according to those who witch water. Well also has poor curb."

Twp. 110N., Rge. 76W.
Sec. 24

40 feet:
"Had trouble finding water on this land but this well has about 30 feet of water and the vein is at the bottom of the hole. Have watered as high as 500 head of stock per day in the summer time."

Twp. 110N., Rge. 78W.
Sec. 2

(Springs):
"Three springs have been developed by curbing and piping. In normal conditions they would water 100 head of stock. A very extensive bed of gravel underlies this area and this gravel lies upon hard pan base. The water from the clouds reaches this gravel and where in the breaks the gravel and hardpan outcrops there are springs and seeps. The flow of the springs is determined by the precipitation. The flow has never failed however dry the year, but during the past six years it has been much reduced. This region is within the artesian belt where fine wells are secured at about 1200 ft."

Twp. 111N., Rge. 74W.
Sec. 20

48 feet:
"I have three wells but none very good, about three or four barrels apiece. Water just above shale. Have drilled down 350 ft. but didn't strike any water to amount to much."

Twp. 111N., Rge. 78W.
Sec. 14

65 feet:
"Have drilled 10 test holes on the quarter section. All veins of water found were weak and not considered worth expense of boring and casing."

Twp. 112N., Rge. 74W.
Sec. 28

38 feet:
"The well on this place used to have 18 ft. of water in it and couldn't be pumped empty until 1930 when it started to go dry and the water is in blue clay. I have an old well that used to water from 75 to 100 head of cattle but it is dry now and is around 30 ft. deep. I have enough water for 25 or 30 head of stock except in hot weather when I have to haul."

Twp. 112N., Rge. 75W.
Sec. 2

113 feet:
"Due to quick sand trouble a 3 inch casing with sand point was used inside of curb and was found to be very satisfactory. Quick sand filled in to a depth of 27 ft. Water level dropped 12 ft. in 33 - 34 and is

| | |
|---|---|
| | now almost back to normal. This well has been pumped for 72 hrs. without lowering water." |
| Twp. 112N., Rge. 76W.<br>Sec. 14 | 1354 feet:<br>"Had a well located by a well known and successful water witch. We tested to a depth of 140 ft. and struck shale." |
| Twp. 112N., Rge. 77W.<br>Sec. 15 | 1480 feet:<br>"We have drilled two shallow wells on our farm, by the house and we could not get any water, although there was 26 ft. of water in both wells. The drillers said there was foul air in them that held the valves open so they would not pump." |
| Twp. 112N., Rge. 77W.<br>Sec. 30 | 243 feet:<br>"This well like most all other wells in this part of the country has a sand point driven in the vein of gravel and the cylinder sets on top of sand point at the bottom of well." |
| Twp. 112N., Rge. 79W.<br>Sec. 33 | 85 feet:<br>"Difficulty was experienced due to quicksand. Six or seven holes were drilled before we found sand we could control." |
| Twp. 112N., Rge. 80W.<br>Sec. 13 | 25 feet:<br>"Have another well 25 ft. from kitchen door for house use 12 ft. deep, recurbed 2 years ago, furnishes two or three barrels per day and water is fairly hard." |
| Twp. 112N., Rge. 80W.<br>Sec. 30 | 145 feet:<br>"I put one well down around 150 ft. deep and could not pump the water out on account of very fine sand and a black fine coal dust like mixed with the sand. This would suck into the cylinder and clog it up so we could not pump it out. There appears to be plenty of water." |

EXTENSION SERVICE
SOUTH DAKOTA STATE COLLEGE
of Agriculture and Mechanic Arts
Brookings, South Dakota

Published and distributed under Acts of Congress, May 8 and June 30, 1914, by the Agricultural Extension Service of the South Dakota State College of Agriculture and Mechanic Arts, Brookings, A. M. Eberle, Director, U. S. Department of Agriculture cooperating.